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The Influence of Types of Gestational Diabetes Mellitus, Self-management, Social Support, and Risk Perception on Health-related Quality of Life in Pregnant Women with Gestational Diabetes Mellitus

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ABSTRACT

Objectives: This study aimed to investigate the factors influencing the health-related quality of life (HRQoL) in pregnant women with gestational diabetes mellitus (GDM).

Materials and Methods: Participants were 140 pregnant women with GDM who were receiving antenatal care at King Chulalongkorn Memorial hospital, Bangkok. Data were collected to obtain information including the self-management questionnaire, the social support questionnaire, perceived risk of GDM questionnaire, and gestational diabetes mellitus questionnaire-36 (GDMQ-36). Data were analyzed by using descriptive statistics, Pearson's product-moment correlation, point biserial correlation, and multiple linear regression.

Results: The results showed that the participants had diagnosed with GDMA1 and GDMA2 equal to 45.7% and 54.3%, respectively. The HRQoL of the participants were 62.06 and influenced by self-management, social support, and risk perception. The HRQoL would be increased if pregnant women had self-management effectively ($\beta = 0.236$, 95% confidence interval (CI) 0.201 to 0.586, $p < 0.001$), received social support ($\beta = 0.222$, 95% CI 0.199 to 0.672, $p < 0.001$), and received information in a proper level ($\beta = -0.644$, 95% CI -0.982 to -0.689, $p < 0.001$).

Conclusion: Improving HRQoL of pregnant women with GDM, health care providers should encourage pregnant women to have effective self-management, receive social support, and perceive the risks of GDM at an appropriate level.

Keywords: gestational diabetes mellitus, self-management, social support, risk perception, health-related quality of life.

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อิทธิพลของชนิดของภาวะเบาหวานขณะตั้งครรภ์ การจัดการตนเอง การสนับสนุนทางสังคม และการรับรู้ภาวะเสี่ยงต่อคุณภาพชีวิตในมิติสุขภาพในสตรีที่มีภาวะเบาหวานขณะตั้งครรภ์

รัชกานต์ พุ่มมณี, ปิยะนันท์ ลิมเรืองรอง, วรรณา พาหุวัฒนกร

บทคัดย่อ

วัตถุประสงค์*: การศึกษาในครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อคุณภาพชีวิตในมิติสุขภาพในสตรีที่มีภาวะเบาหวานขณะตั้งครรภ์*

วัสดุและวิธีการ*: ศึกษาในสตรีที่มีภาวะเบาหวานขณะตั้งครรภ์ จำนวน 140 ราย ที่เข้ารับบริการฝากครรภ์ที่โรงพยาบาลจุฬาลงกรณ์ สภากาชาดไทย กรุงเทพมหานคร แบบสอบถามที่ใช้ในการเก็บรวบรวมข้อมูล ได้แก่ แบบสอบถามการจัดการตนเอง แบบสอบถามการสนับสนุนทางสังคม แบบสอบถามการรับรู้ภาวะเสี่ยงของภาวะเบาหวานขณะตั้งครรภ์ และแบบสอบถาม GDMQ-36 วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนา สหสัมพันธ์ของเพียร์สัน สหสัมพันธ์แบบพอยท์ไบซีเรียล และการวิเคราะห์การถดถอยพหุคูณ*

ผลการศึกษา*: จากผลการศึกษา พบว่า กลุ่มตัวอย่างได้รับการวินิจฉัยภาวะเบาหวานขณะตั้งครรภ์ชนิดที่ 1 และ 2 จำนวนร้อยละ 45.7 และ 54.3 ตามลำดับ กลุ่มตัวอย่างมีค่าเฉลี่ยคะแนนคุณภาพชีวิตในมิติสุขภาพ เท่ากับ 62.06 คะแนน โดยปัจจัยที่ส่งผลกระทบต่อคุณภาพชีวิตในมิติสุขภาพ ได้แก่ การจัดการตนเอง การสนับสนุนทางสังคม และการรับรู้ภาวะเสี่ยง โดยคุณภาพชีวิตในมิติสุขภาพจะเพิ่มขึ้นเมื่อกลุ่มตัวอย่างมีการจัดการตนเองอย่างมีประสิทธิภาพ (β = 0.236, 95% CI 0.201 to 0.586, $p < 0.001$) ได้รับการสนับสนุนทางสังคม (β = 0.222, 95% CI 0.199 to 0.672, $p < 0.001$) และมีการรับรู้ภาวะเสี่ยงในระดับที่เหมาะสม (β = -0.644, 95% CI -0.982 to -0.689, $p < 0.001$)*

สรุป*: การส่งเสริมคุณภาพชีวิตในมิติสุขภาพของสตรีที่มีภาวะเบาหวานขณะตั้งครรภ์ เจ้าหน้าที่ทีมสุขภาพควรสนับสนุนให้สตรีตั้งครรภ์ มีการจัดการตนเองอย่างมีประสิทธิภาพ ได้รับการสนับสนุนทางสังคม และมีการรับรู้ภาวะเสี่ยงของโรคในระดับที่เหมาะสม*

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Introduction

Gestational diabetes mellitus (GDM) is one of the most common complications during pregnancy, characterized by abnormal carbohydrate intolerance that causes pregnant women to struggle with controlling their blood glucose levels within the normal range[1]. Over the past 30 years, the prevalence of GDM has been approximately 14.0%[2]. In Asia, the prevalence of GDM varies widely, ranging from 1.2% to 49.5%, depending on individual characteristics and contextual factors[3]. In 2019 and 2020, the incidence of GDM at King Chulalongkorn Memorial hospital was 12.04% and 11.18%, respectively[4,5]. During pregnancy, especially in the second and third trimesters, physiological changes in placental hormones can lead to insulin resistance, resulting in elevated blood glucose levels[6], which lead complications to both mother and fetus. However, behavioral modifications including dietary controlling, exercising, self-monitoring blood glucose, or receiving pharmacological treatment can significantly improve maternal and fetal outcomes by maintaining blood glucose levels within the normal range[7]. Consequently, healthcare providers play an important role in providing care and encouraging pregnant women to modify health behaviors to effectively manage GDM[8].

All physiological and psychological changes in pregnant women all affect their well-being and health-related quality of life (HRQoL), which person's perception about health status, illness, and treatment that affect their physical, psychological, social, and role(9). If pregnant women go through normal changes until giving birth and are able to cope with their changes effectively, these will result in good HRQoL[10,11]. Conversely, pregnant women diagnosed with GDM often encounter negative experiences due to the unexpected diagnosis and may face barriers when attempting to follow medical recommendations. Additionally, they need to adhere to strict dietary restrictions to control their blood glucose levels, which can lead to frustration and feelings of loss of control[12-14]. Moreover, for those with GDM type A2, insulin injections can cause mental stress, further impacting their HRQoL[15-17].

HRQoL is one of the health indicators that reflects one's perception about illness and treatment based on the pregnant woman's life, mental status, stress limits in daily activities, or treatment burden. Almost of studies focus on general or some aspect of quality of life, which is quite difficult to evaluate and adapt in medical care[8,15,18,19]. To facilitate well-being through optimally effectiveness medical care for pregnant women with GDM, this study uses a gestational diabetes mellitus questionnaire-36 (GDMQ-36) as diabetic arising in pregnancy-specific measure[20]. Therefore, the researcher was interested in investigating factors influencing the HRQoL in pregnant women with GDM, providing valuable insights for the development of care plans aimed at enhancing HRQoL for this population.

Materials and Methods

The research proposal was approved by the Institutional Review Board on Research Involving Human Subject of the Faculty of Nursing, Mahidol university and the Faculty of Medicine, Chulalongkorn University. After that, this predictive study was conducted at antenatal care clinic, King Chulalongkorn Memorial hospital. The participant were 140 pregnant women with GDM, and inclusion criteria as follow; (1) aged 18 years old or older; (2) diagnosed with GDM at least one month before recruited in the study; and (3) gestational age between 24 to 42 weeks. Pregnant women with obstetrical complications, medical complications, psychiatric problems, and fetal abnormalities were excluded from this study.

The sample size calculation was performed using the G*Power program, relying on the correlation coefficient obtained from Ansarzadeh et al[18]. These findings led to the determination of the sample size through the square multiple correlation (R2 = 0.085), resulting in an effect size of 0.094. The power of the test was set at 0.80, with a significant level of 0.05 and four predictor variables. The desired sample size was 132, with an additional 7% added to account for potential nonresponse[18], resulting in a final participant

count of 140.

The data collection instrument comprised five parts, including:

(1) The demographic characteristics questionnaire.

(2) The self-management questionnaire, which was constructed by Radarith et al[21], has a content validity index (CVI) value of 1.0 and a Cronbach's alpha coefficient of 0.78, consists of 20 items categorized into four domains: dietary control, physical activity, glucose management, and medication. For participants with GDM type A1, items 1 to 17 were answered, while those with GDM type A2 responded to all 20 items, with items 18 to 20 specifically addressing medication. The questionnaire is based on a five-point Likert scale ranging from 0 to 3. The possible score range was 0 to 51 for GDM type A1 and 0 to 60 for GDM type A2. Subsequently, scores were transformed to a 0-100 scale, with higher scores denoting better self-management compared to lower scores.

(3) The social support questionnaire, the Tachasaksri et al[22] was used. CVI and a Cronbach's alpha coefficient was equal to 1.0 and 0.96, respectively. This questionnaire comprises 15 items organized into four domains: emotion, assistance with tasks, information, and material aid. It used a four-point Likert scale ranging from 1 to 4 with score ranging from 15-60 with higher scores indicating a greater level of perceived social support.

(4) Perceived risk of GDM questionnaire was developed by Untharin et al[23] and consists of 10 items. CVI and a Cronbach's alpha coefficient was equal to 1.0 and 0.89, respectively. Participants rated their responses using a five-point Likert scale ranging from 1 to 5. The potential score range for this questionnaire is 10 to 50, where a higher score indicates a greater perception of the risk associated with GDM compared to a lower score.

(5) The quality-of-life questionnaire for women with GDM (GDMQ-36) was originally designed by Mokhlesi et al[20], which a CVI value of 0.99 and a Cronbach's alpha coefficient of 0.93, and back translation by the researcher. This questionnaire comprises 36 items categorized into five subscales (concerns about high-risk pregnancy, perceived constraints, disease complications, medication and treatment, and support). Participants responded to the questionnaire using a five-point Likert scale ranging from 1 to 5. For participants with GDM type A2, all 36 items were completed, resulting in a score range between 36 to 180. Conversely, for those with GDM type A1, all items were answered except for 26, 27, 29, and 30, which pertain to medication. Consequently, their possible score range was 32 to 160. Subsequently, all scores were converted to a scale of 0 to 100, with higher scores indicating a better HRQoL than lower scores.

All the questionnaires underwent a validation process, which included assessment by one obstetrician and two midwifery lecturers. The results of CVI for all questionnaires were equal to 1. Regarding reliability, the questionnaires were tested on a sample of 30 pregnant women with GDM. The result of Cronbach's alpha of the self-management questionnaire, the social support questionnaire, perceived risk of GDM questionnaire, and GDMQ-36 were equal to 0.74, 0.90, 0.96, and 0.92, respectively.

Descriptive statistics, including the mean, standard deviation, and percentages, were used to describe the characteristics of the data. Pearson's product-moment correlation was used to assess the correlation between self-management, social support, and risk perception with HRQoL, while the type of GDM was examined using point biserial correlation. For determine the influencing factors for HRQoL, multiple linear regression analysis was employed, with a significance level set at 0.05.

Results

The mean age of the participants was 33.59 years (standard deviation (SD) = 4.83), with 97.9% of them being married, and 55.7% having completed a bachelor's degree or higher. About one-third (39.3%) of the participants were employed by companies, while 27.9% worked freelance. The mean monthly income

for participants was 42,485.71 baht (SD = 19,884.37). Additionally, 62.3% had a family history of diabetes mellitus, and 29.7% had a family history of hypertension. In terms of pre-pregnancy body mass index (BMI), 40% were in the normal range, while 50% were overweight or obese, with a mean pre-pregnancy BMI of 25.62 kg/m2 (SD = 5.27). A majority of participants (60.7%) were multiparous. The mean gestational age at the baseline visit was 32.11 weeks (SD = 4.33). Among the participants, 45.7% were diagnosed with GDM type A1, and 54.3% with GDM type A2. Regarding blood glucose levels, fasting glucose averaged 85.69 (SD = 11.86), one-hour postprandial glucose was 128.11 (SD = 19.84), and two-hour postprandial glucose was 107.34 (SD = 13.79). Among those with multiparous (37.7%) had been diagnosed with GDM (Table 1).

Table 1. Demographic and characteristics of participants (n = 140).

Characteristics	mean ± SD	n (%)
Mean age ± SD (years)	33.59 ± 4.83	
Married status		137 (97.9%)
Education		
Middle school		17 (12.1%)
Senior high school/Vocational Certificate		39 (27.9%)
Associate degree/High Vocational Certificate		6 (4.3%)
Bachelor's Degree or higher		78 (55.7%)
Mean income ± SD	42,485.71 ± 19,884.37	
Family history		
Diabetes mellitus		86 (62.3%)
Hypertension		41 (29.7%)
Others		11 (8.0%)
Pre-pregnancy BMI (kg/m^2)	25.62 ± 5.27	
Underweight (< 18.5)		14 (10%)
Normal (18.5 – 24.9)		56 (40%)
Overweight/obese (≥ 25.0)		70 (50%)
Multigravida		85 (60.7%)
Past obstetrics		
GDM		29 (20.7%)
Mean gestation ± SD	32.11 ± 4.33	
Type of GDM		
GDM type A1		64 (45.7%)
GDM type A2		76 (54.3%)
Blood glucose level (mg/dL)		
Fasting < 95		109 (77.9%)
1 hour-PP < 140		115 (82.1%)
2 hour-PP < 120		119 (85.0%)

SD: standard deviation, BMI: body mass index, PP: post prandial

Table 2. The participant's self-management, social support, risk perception, and HRQoL score (n = 140).

Variables	mean ± SD	n (%)
Self-management	85.37 ± 7.61	
High level		139 (99.3%)
Moderate level		1 (0.7%)
Low level		0 (0.0%)
Social support	52.96 ± 6.49	
High level		115 (82.1%)
Moderate level		25 (17.9%)
Low level		0 (0.0%)
Risk perception	31.89 ± 9.81	
High level		40 (28.6%)
Moderate level		75 (53.6%)
Low level		25 (17.8%)
HRQoL	62.06 ± 12.72	
High level		24 (17.1%)
Moderate level		95 (67.9%)
Low level		21 (15.0%)

HRQoL: health-related quality of life, SD: standard deviation

The study findings revealed that participants reported a high level of self-management (mean = 85.37, SD = 7.61) and a high level of social support (mean = 52.96, SD = 6.49). They had a moderate level of risk perception (mean = 31.89, SD = 9.81) and a moderate level of HRQoL (mean = 62.06, SD = 12.72) (Table 2).

The correlation between variables is shown in Table 3. Statistically significant factors associated with HRQoL were type of GDM ($r = -0.250$, $p < 0.05$), self-management ($r = 0.358$, $p < 0.01$), social support ($r = 0.277$, $p < 0.01$) and risk perception ($r = -0.682$, $p < 0.01$). In terms of independent factors influencing HRQoL, multiple linear regression analysis was conducted (Table 4). The study revealed that the type of GDM, self-management, social support, and risk perception collectively predicted HRQoL among pregnant women with GDM, accounting for 59.4% of the variance ($R2 = 0.594$, $p < 0.001$). Notably, self-management ($\beta = 0.236$, 95% confidence interval (CI) 0.201 to 0.586, $p < 0.001$), social support ($\beta = 0.222$, 95% CI 0.199 to 0.672, $p < 0.001$), and risk perception ($\beta = -0.644$, 95% CI -0.982 to -0.689, $p < 0.001$) were significant predictors of HRQoL.

Table 3. Correlation of study variables (n = 140).

	1	2	3	4	5
1. type of GDM (r_{pb})	1				
2. self-management (r)	0.145	1			
3. social support (r)	-0.430**	0.190*	1		
4. risk perception (r)	0.214*	-0.134	0.009	1	
5. HRQoL (r)	-0.250*	0.358**	0.277**	-0.682**	1

*p < 0.05, **p < 0.01, rpb = Point biserial correlation, r = Pearson's product moment correlation, GDM: gestational diabetes mellitus (GDM), HRQoL: health-related quality of life, r_{pb} = Point biserial correlation, r = Pearson's product moment correlation

Table 4. Multiple linear regression for predicting HRQoL among participants (n = 140).

Variables	β	Std. Error	p - value	95% CI
constant		9.515	0.001	13.803, 51.438
Self-management	0.236	0.098	< 0.001	0.201, 0.586
Social support	0.222	0.120	< 0.001	0.199, 0.672
Risk perception	-0.644	0.074	< 0.001	-0.982, -0.689
$F = 49.470$, $p = .000$, $R^2 = 59.4\%$ (adjust $R^2 = 58.2\%$)				

Independent variables: type of gestational diabetes mellitus, self-management, social support, risk perception
HRQoL: health-related quality of life, Std. error: standard error, CI: confidence interval

The study findings revealed that participants reported a high level of self-management (mean = 85.37, SD = 7.61) and a high level of social support (mean = 52.96, SD = 6.49). They had a moderate level of risk perception (mean = 31.89, SD = 9.81) and a moderate level of HRQoL (mean = 62.06, SD = 12.72) (Table 2).

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Discussion

From the beginning of diagnosis GDM, pregnant women received information about event that can occur during pregnancy and behavioral modifications, all of these involve with distress. So, pregnant women were likely to describe that GDM as stressful event. Regardless of GDM progression and treatment, some of pregnant women exhibited well-being. According to the study, the participants had a mean HRQoL score of 62.06 as a moderate level. This was analogous to prior research[16,17,19,24]; however, this study used GDMQ-36 as more disease-specific and valid for assessing quality of life in pregnant women with GDM. In accordance with the findings of this study, self-management– the ability to change behaviors in order to control blood glucose levels– affect the HRQoL in pregnant women with GDM which was complementary to previous research[15,18]. Good maternal and neonatal health outcomes through behavioral modifications including diet, exercise, and self-monitoring blood glucose level can be reduced stress[13]. This may be explained that receiving care from super tertiary care hospitals which offer specific and diverse self-care options, such as monitoring the mother's and fetus's health by an obstetrician, providing disease progression control by internists, providing diet care by nutritionists, and providing self-care training by nurses, results in effective blood glucose level management of pregnant women[7]. Stress and worry will be reduced if those pregnant women maintain routine bodily changes throughout their pregnancy without difficulties. HRQoL develops as a result. Thus, healthcare providers must assist pregnant women to self-manage in areas such as food, exercise, complications monitoring and assessment, and proper pharmacological treatment for successful and continuous treatment.

Similarly, the study discovered that social support could strongly predict HRQoL in women with

GDM. This was consistent with previous research that demonstrated peer support, particularly from husband, doctors, and nurses, greatly aid pregnant women with GDM[8]. It was noted that the majority of the participants were married, therefore they received pleasant comfort and understanding from their husbands. This is especially beneficial in dealing with illness and offering relaxation from strict behavioral changes. Furthermore, receiving efficient and continuous care from healthcare providers, receiving information on self-care and attending antenatal care with the same medical team throughout the pregnancy, or obtaining behavioral modification (e.g., blood glucose monitoring devices, mother class for GDM, telemedicine) will establish confident behavioral modification in pregnant women[14, 25], resulting in relaxation and less anxiety[26, 27]. To help pregnant women to manage gestational diabetes thoroughly, healthcare providers should provide both physical and psychological assistance, as well as promote participatory care from family or husband.

Furthermore, the study's findings demonstrated that risk perception can strongly predict HRQoL in women with GDM. When the participants maintained a high-risk perception, HRQoL declined. This might be analyzed to see if the participants were informed about the disease, as well as possible affections and consequences. Furthermore, they were subjected to more strict behavioral modifications than typical pregnant women. These may cause the perception that GDM is a serious illness, as well as anxiety and stress[12,28]. So that, HRQoL was declined. As a result, healthcare providers should deliver an appropriate level of information that promotes behavioral modifications without causing anxiety. Moreover, assessment for risk perception after receiving information about GDM should also be considered.

The following are some of the study's strengths. To begin, the study's design indicates the size of the influence of factors affecting HRQoL, providing an insightful awareness of the relevance of enhancing HRQoL in women with GDM. Second, unlike prior investigations, this study employed HRQoL questionnaires designed specifically for pregnant women with GDM rather than a general assessment. And this study demonstrated a high relationship between guidelines of care and HRQoL. Some limitations should be addressed, the sample size was small. Second, the context of the study setting differed in this study, making it inappropriate to generalize to primary and secondary care institutions. However, the findings of this study showed that the factors influencing HRQoL in pregnant women with GDM should encourage healthcare providers to collaborate in order to give better treatment guideline to pregnant women.

Conclusion

According to the findings of the study, self-management, social support, and risk perception can all affect the HRQoL in women with GDM. To improving HRQoL, emphasizing self-management to maintain normal blood glucose levels, promoting social support both physically and mentally, and providing acceptable and appropriate care based on the pregnant woman's life should be undertaken by healthcare providers simultaneously.

Potential conflicts of interest

The authors declare no conflicts of interest.

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